

CLAIMS

1. A method of forming a film on a substrate comprising:
 - (a) positioning the substrate on a support in a chamber;
 - (b) supplying to the chamber in gaseous or vapour form a silicon-containing organic compound and an oxidising agent in the presence of a plasma to deposit a film on the substrate; and
 - (c) setting the film such that carbon-containing groups are contained therein.
2. A method according to claim 1, wherein the oxidising agent is oxygen.
3. A method according to claim 1 ~~or 2~~, wherein the silicon-containing organic compound is an alkylsilane.
4. A method according to ~~any preceding~~ claim 1, herein the silicon-containing organic compound is a tetraalkylsilane.
5. A method according to claim 4, wherein the silicon-containing organic compound is tetramethylsilane.
6. A method according to claim 1 ~~or 2~~, wherein the silicon-containing organic compound is a methyisilane.
7. A method according to claim 3, wherein the silicon-containing organic compound is cyclohexyldimethoxymethylsilane.

8. A method according to ~~any preceding~~ claim, wherein the film is deposited on a substrate positioned on a low temperature support.

9. A method according to claim 6, wherein the support is at a temperature between about 0°C to about 60°C.

10. A method according to claim 6 ~~or claim 7~~ wherein the support is at about 30°C,

11. A method according to ~~any preceding~~ claim, further comprising providing a plasma during deposition of the film.

12. A method according to ~~any preceding~~ claim, wherein the set film has a dielectric constant of about 2.55 or less.

13. A method of forming a film on a substrate comprising:

(a) positioning the substrate on a support in a chamber.

15 (b) supplying to the chamber in gaseous or vapour form tetramethylsilane and oxygen in the presence of a plasma to deposit a film on the substrate; and

(c) setting the film such that carbon-containing groups are contained therein.

20 14. A method according to ~~any preceding~~ claim¹³ further comprising supplying the plasma from an RF power source connected to an electrode opposing the substrate support.

15. A method according to any preceding claim ^{b3} wherein the substrate support is at D.C. ground during the application of the plasma.
16. A method as claimed in any one of the preceding claims ^{b3} wherein the film is set by exposing it to an H₂ containing plasma without any prior annealing or heating step.
17. A method as claimed in claim 16 wherein the H₂ containing plasma is substantially only a H₂ plasma.
18. A method as claimed in claim 16 ~~or 17~~ wherein the H₂ containing plasma treatment last for between 30 seconds and 30 minutes.
19. A method as claimed in claim 16 ~~or 17~~ wherein the H₂ containing plasma treatment lasts from 1 to 10 minutes.
20. A method as claimed in claim 16 ~~or 17~~ wherein the H₂ containing plasma treatment step lasts no more than 5 minutes.
21. A method as claimed in claim 16 ~~or 17~~ wherein the H₂ containing plasma treatment step lasts no more than 10 minutes.
22. A method as claimed in claim 16 where the hydrogen containing plasma is applied simultaneously with heating.

23. A method as claimed in claim 22 where the substrate is heated to approximately 400°C.

24. A method substantially as hereinbefore described with reference to the accompanying drawings and examples.

5 25. A method as claimed in claim 1 where the setting of the film substantially removes water and/or OH peaks from the FTIR spectra of the as deposited film.

10 26. An apparatus for forming a film on a substrate, the apparatus comprising:

- (a) a support for the substrate positioned in a chamber;
- (b) means for supplying to the chamber in gaseous or vapour form a silicon-containing organic compound and an oxidising agent in the presence of a plasma to deposit a film on the substrate; and
- (c) means for setting the film such that carbon-containing groups are contained therein.

15 27. An apparatus according to claim 26, further comprising means for improving the uniformity of the deposition of the film on the substrate.

20 28. An apparatus according to claim 27, wherein the means for improving the uniformity is arranged around a showerhead.

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29. An apparatus substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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